

WHAT IS CLAIMED IS:

1. A pattern forming method, in which a desired pattern is exposed on to a surface of a substrate to form a pattern on the substrate surface, comprising the steps of:

detecting a defect on said substrate surface;

analyzing the mutual positional relationship between the detected defect and a pattern to be formed on said substrate surface; and

based on the result of the analysis, correcting the pattern position in the step of pattern exposing on to said substrate surface in said pattern.

2. The pattern forming method according to claim 1, wherein the arranging position of the pattern is corrected such that the defect is not positioned in an edge of the pattern.

3. The pattern forming method according to claim 2, wherein the pattern position is corrected by shifting the pattern position in x- and/or y-directions.

4. The pattern forming method according to claim 2, wherein the pattern position is corrected by swinging the pattern position by 90° .

5. The pattern forming method according to claim 2, wherein the pattern position is corrected by swinging the pattern position by 180° .

6. The pattern forming method according to claim 2, wherein the pattern position is corrected by

swinging the pattern position by 270° .

7. The pattern forming method according to claim 2, wherein the pattern position is corrected by shifting the pattern position in x- and/or y-directions and by swinging the pattern position.

8. The pattern forming method according to claim 2, wherein said substrate that is to be exposed is a wafer having a resist film formed thereon.

9. A pattern forming method, in which a main surface of a mask blank used for preparation of a photomask is exposed in a desired pattern to form a mask pattern on said mask blank, comprising the steps of:

forming position measuring marks on at least two points on a main surface of said mask blank;

detecting a defect on the main surface of said mask blank and obtaining defect analysis data including at least the kind of said defect and the position of the defect relative to said position measuring marks;

comparing the obtained defect position with the relative position of the mask pattern that is to be formed on the mask blank so as to select the mask arranging position relative to the mask blank; and

measuring the position measuring mark to calculate the light exposure position and applying an exposure treatment to the selected position.

10. The pattern forming method according to

claim 9, wherein the pattern arranging position is selected such that a defect is not positioned on an edge of the pattern.

11. The pattern forming method according to
5 claim 9, wherein:

said mask blank comprises a transparent substrate and a light shielding film formed on said transparent substrate;

10 said defect includes a black type defect and a white type defect; and

the pattern arranging position is selected such that said black type defect is buried in a light shielding film pattern, and said white type defect is exposed to a pattern opening that is not covered with
15 said light shielding pattern.

12. The pattern forming method according to claim 9, wherein:

20 said mask blank comprises a supporting substrate, a reflecting film formed on said supporting substrate, and a light shielding film formed on said reflecting film;

said defect comprises a defect that lowers the reflectivity and a reflection defect; and

25 a pattern arranging position is selected such that said defect lowering the reflectivity is buried in a non-reflecting pattern and said reflection defect is positioned on an opening that is not covered with a

light shielding film pattern.

13. The pattern forming method according to claim 9, wherein the pattern position is corrected by shifting the pattern position in x- and/or y-directions.

5 14. The pattern forming method according to claim 9, wherein the pattern position is corrected by swinging the pattern position by 90° .

10 15. The pattern forming method according to claim 9, wherein the pattern position is corrected by swinging the pattern position by 180° .

16. The pattern forming method according to claim 9, wherein the pattern position is corrected by swinging the pattern position by 270° .

15 17. The pattern forming method according to claim 9, wherein the pattern position is corrected by shifting the pattern position in x- and/or y-directions and by swinging the pattern position.

20 18. An exposure apparatus, comprising:
means for exposing a substrate surface in a desired pattern;

means for detecting a defect on the surface of said substrate;

25 means for analyzing the mutual positional relationship between the defect detected by said detecting means and a pattern that is to be formed on the surface of the substrate; and

means for correcting the pattern position in the

step of exposing the substrate surface in said pattern based on the result of the analysis.

19. The exposure apparatus according to claim 18, wherein:

5 said means for detecting a defect on the surface of the substrate includes a laser light source and a defect detector;

10 said means for analyzing said mutual positional relationship consists of a defect detecting-defect position calculating section; and

 said means for correcting the pattern position in the step of exposing the substrate surface in said pattern consists of a pattern arrangement shift treating section.

15 20. The exposure apparatus according to claim 19, wherein said pattern arrangement shift treating section performs at least one of shifting of the pattern position in x- and/or y-directions and swinging of the pattern position.